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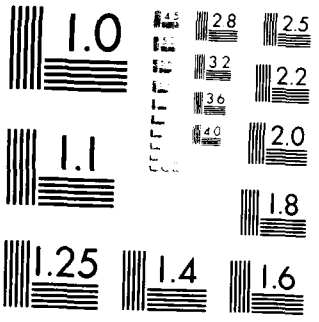

AIR FORCE HEALTH CARE PROVIDERS: AUTOMATION CONCERNS RELATING TO - NEEDS, EXPERIENCE, AND SUPPORT

Report By

Captain Michael L. Perry

HQ USAF/SGSIW

22 May 1987

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Executive Summary

This study suggests that the most requested medical computer systems within the Air Force medical community are those that support test results, medical records, and patient scheduling. Although those results change when the data is viewed by different medical specialties, they still remain in very high demand.

Overall, there is no correlation between military grade and computer support or military grade and computer experience. There is, however, a correlation between medical specialty and computer support and computer experience. However, the correlation appears driven by computer education. This implies that educating key staff in computer related subjects can play a major role in gaining support for medical computer applications.

AIR FORCE HEALTH CARE PROVIDERS: AUTOMATION CONCERNS RELATING TO - NEEDS, EXPERIENCE, AND SUPPORT

Introduction

The Organization

The Department of the Air Force was established and made a part of the Department of Defense by the National Security Act of 1947 and by the terms of that Act came into legal being on September 18, 1947. The organizational structure of the Air Force is designed around a functional and geographical pattern. Functionally, the Air Force organization may be classified as offensive, defensive, supporting, training, and research. (See Appendix A and Figure 1.) Geographically, a single command may be responsible for two or more functional elements.

The Air Forces' primary functions are to organize, train, and equip Air Force forces for the conduct of prompt and sustained combat operations in the air.

The Air Force Medical Field plays a supporting role in this function. Primarily, its functions are to maintain the health of Air Force forces, to ensure maximum wartime readiness, and to be combat capable. It will also provide, to the greatest extent possible, a peacetime health care system for all beneficiaries. In order to do this, it is organized to support the Air Staff as noted in Figure 2 and to support geographically dispersed bases as noted in Figure 3.

In order to carry out the Air Force mission, it has an active duty force of approximately 600,000 (Air Force Magazine, 1986). This active duty force makes up only a portion of the total beneficiary population. Adding other beneficiaries, such as retirees and dependent family members, increases the beneficiary population to approximately three million in the Air Force and nine million Department of Defense-wide.

In order to meet the mission requirements and give these beneficiaries the high quality of health care expected, the Medical Field employs a staff of approximately 53,000 (Air Force Magazine, 1986). The staff is designed to cover most, if not all, unique Air Force military medical needs. In addition to the administrative corps, nursing corps, and dental corps, and according to the Air Force Clinical Consultant Division, Headquarters United States Air Force, the medical field has a large contingency of health care providers representing various medical specialties. (See Appendix B for list.)

The Problem

The geographically dispersed medical treatment facilities as noted in Figure 3, the large transient beneficiary population as noted above, the limited number of selected medical specialists on active duty as cited by the United States Medical Recruiting Service, and the variety of

medical needs due to these factors, make the needs of the Air Force health care providers especially unique. For example, a patient could contact malaria while stationed in another part of the world and later be transferred to Blytheville Air Force Base, Arkansas prior to the symptoms manifesting themselves. Once at the new location, the condition may become acute and require medical care; consequently, the Air Force health care providers must be aware of, not only conditions indigenous to the United States, but other countries, as well.

Another need centers around wartime applications where the medical field must plan, develop and practice wartime medicine. For example, different medical stations must be set up to handle and transfer the wounded. Helicopters pick up the wounded on the front lines and transfer them to staging areas. After stabilization, the patients are transferred to facilities with more definitive care capabilities; until finally, they may end up in United States hospitals. This requires coordinating the transfer of the patients, medical records, health care providers, and supplies.

These diversified and unique health care provider systems are being met through the use of computers, such as the computer assisted processing of cardiograms found in Appendix C. Unfortunately, many of these needs have been

addressed through a top down approach as noted in the Department of Defense Directive (DOD) Directive Number 6000.5 (June 11, 1976); DOD Directive Number 5136.1 (October 5, 1984); and House of Representatives H. R. 4428 (June 25, 1986). The needs of these agencies, instead of the needs of the health care providers, are driving the development of these medical computer systems. Thus, the majority of medical computer systems listed below have been or are being brought on-line with limited user involvement. (See Appendix C for systems names and explanations.)

It appears that most of the health care providers' medical computer needs, computer experience, and support or nonsupport of these medical computer systems have not been directly addressed. For example, I have traveled to many medical treatment facilities worldwide and have found many medical computer systems that are very seldom, if at all, used. This limited use appears to be the symptom. The problem, as mentioned, seems to be that the medical computer systems **do not meet the users needs or are too complicated** for them to use without extensive training. This seems to translate into a lack of support by the users which is making it difficult to manage existing medical computer systems and to plan and implement future medical computer systems.

Project Deliverable

The project deliverable will be a one to two page

position paper as outlined in Tongue and Quill: Communication To Manage In Tomorrow's Air Force (July 19, 1982) and used as an introduction to evaluate my proposal. (See Appendix D for position paper.) A position paper is written to take a stand on an issue. The concluding paragraph will contain a specific recommendation for action.

The position paper will be submitted to the Air Force Medical Service Information Systems Division and the Department of Defense's Medical Systems Support Center. The following people will most likely decide whether my recommendations have merit:

Colonel Charles W. B. Morrison
Chief, Medical Service
Information Systems Division
Office of the Surgeon General

Michael J. Mestrovich, PhD
Director
Department of Defense's Medical
Systems Support Center

If the Air Force accepts my recommendation, it could directly impact 82 hospitals and 39 clinics worldwide; indirectly it could affect approximately three million beneficiaries. If the Department of Defense accepts my recommendation, it could directly impact 168 hospitals and 300 clinics worldwide; indirectly it could effect approximately nine million beneficiaries.

The factors by which the Air Force and Department of Defense would judge my recommendation are as follows: a) They would review Air Force Inspector General and major command complaints that relate to health care, specifically automation and lack of automation. In so doing, they would have insured that I addressed a problem and not its symptom and that my approach is understandable. b) They would look at the feasibility of my recommendations. Specifically, is it cost effective, technologically feasible, and politically viable. c) They would check the validity and reliability of my survey instrument. d) Finally, they would review my analysis.

If my recommendation is accepted, it would be used in developing the Air Force Medical Service Information Systems Division's Medical Service Information Systems Five Year Plan and as input into the Department of Defense's Medical Systems Support Center's Planning, Programming, and Budgeting System process.

Approach

Overview

The objectives of this project are to ascertain the computer needs of medical health care providers. This will be done by medical specialty and military grade. For example, neurosurgeons may have a greater need for

medical expert systems while family practitioners may have a greater need for automated medical records. In addition, the demand will be broken down by military grade. For example, colonels may not find differential diagnostic trees helpful while captains who have not been practicing as long may find them useful.[1] Consequently, a certain system may have to be aimed at certain groups.

A second purpose is to analyze the computer experience of the health care providers. In so doing, their experience will be correlated against their medical specialty and military grade.

The final purpose is to analyze whether they will support existing and proposed medical computer systems. I plan to look at the correlation between who supports automation and their medical speciality and military grade. For example, junior medical officers, such as captains and majors, may be more inclined to support automation, due to recent use of computers in school; while more senior medical officers, such as lieutenant colonels and colonels, may not have had that experience and thus my be less supportive. This being the case, the implementation of certain medical computer systems may have to be postponed until the senior medical officers' attitudes change through education or they

leave the Air Force through attrition.

A survey instrument will be used to capture this data. Using a stratified sample, the survey will be sent to one large hospital, one small hospital, and one clinic for each major command.[2] (See Appendix E for the list of 28 medical treatment facilities that will be contacted.) A total of approximately 1200 health care providers, or ten percent of the total military health care provider population, will be surveyed[3].

Method

Several systematic steps will be required to produce the end product of this study. Those steps are as follows:

Gather Data. Oppenheim's Questionnaire Design and Attitude Measurement (1976) and Stone's Research Methods in Organizational Behavior (1978) were used as guides in developing and conducting interviews with the health care providers in the Clinical Consultants Division, Office of the Surgeon General. (See Appendix F for names.) Doctors Quintana (Colonel) and Opsut, Senior Health Services Analysts, Health Affairs and Plans Division, Office of the Surgeon General, reviewed the survey and made recommendations. The final close-ended survey was tested at the Bolling Air Force Base's medical treatment facility.

In addition, the close-ended survey (Appendix G) was forwarded to Headquarters Air Force Manpower Personnel Center/DPMYOS, Randolph Air Force Base, Texas for review and Air Force approval. This survey was forwarded, along with a cover letter (see Appendix H), in accordance with Air Force Regulations 12-30 Air Force Freedom of Information Act Program, 12-35 Air Force Privacy Act Program and 30-23 Air Force Personnel Survey Program. This approval was required by the Air Force prior to any survey being administered to its personnel.

Following approval of my plan, the survey will be sent via a staff summary sheet (see Appendix I) to the Air Force Clinical Consultants Division, the Air Force Aerospace Medical Consultants Division, the Air Force Medical Service Information Systems Division, and the Chief, Air Force Medical Service Corps for review and coordination. Upon completion, it will be forwarded to Brigadier General DeHart, Director of Professional Affairs and Quality Assurance, United States Air Force, Office of the Surgeon General, for review, approval, and signature.[4]

General DeHart's letter, along with the survey, will be sent to the medical treatment facilities identified in Appendix E. At these facilities, the survey will be photocopied and distributed to all health

care providers. Upon completion of the survey, it will be sent to the Resource Manager at each facility who, in turn, will forward it to me at the Air Force Medical Service Information Systems Division, Liaison Office, Bolling Air Force Base, Washington DC.

Analysis. The analysis will be approached as follows:

1) First, I will analyze question 10, Appendix G in order to list the top three medical computer systems requested by the health care providers. In so doing, I will assign a weighted value to each of the three selections. More specifically, the first, second, and third selections for each respondent will have values of three, two, and one respectively. These weighted selections will be added together with their identical selections from other respondents. Thus, the top three medical computer systems will be identified. In addition, these top three choices will be displayed further by medical specialty. Consequently, in addition to showing which medical computer systems the medical users want, it will also show if there is a difference in needs among the different medical specialties and military grades.

2) Secondly, I will use an analysis of variance[5] (ANOVA) process in order to analyze the results.

Responses to questions number one, five, six, seven, eight, and nine of Appendix G will be added together to develope a variable labeled "degree of support". Responses to questions two, three, and four will be added together to develope a variable labeled "degree of experience". Both support and experience will be examined to determine if there are any differences based on medical specialty or military grade.

Some specialties, such as neurology, are limited in number. Thus, a representative sample for that specific specialty is unlikely. Consequently, the specialties will be divided into groups. For example, one group will consist of continuing care health care providers such as internists, pediatricians, family practitioners, gynecologists, etc., while the other group would consist of the more high technology based providers of care such as neurologists, cardiologists, radiologists, etc.

An analysis of variance will be used to test, using an alpha level of 0.05, the hypothesis of equal measure for the two specialty groups for support and experience. The null hypotheses are as follows:

a) H_o: There is no difference in the way support is viewed by different medical specialists.

b) H_o: There is no difference in the way support is viewed by different military grades.

c) H_O: There is no difference in computer experience among different medical specialists.

d) H_O: There is no difference in computer experience among different military grades.

Through ANOVA, I will be able to analyze if support and experience differs by medical specialty or military grade. If it does, then my position paper recommendation would use this information as a justification in aiming change mechanisms at certain medical specialties and military grades.

3) Because grade and experience and specialty and experience are most likely highly correlated, it is necessary to examine their separate and common effects on support. A Two-way ANOVA[6] is needed to understand this statistical significance of interaction effects. In so doing, I will analyze support and experience while holding medical specialty constant; and support and experience while holding military grade constant. Again, the specialties will be divided into groups. The same questions and alpha level, as noted above for the ANOVA, will be used.

The null hypotheses are as follows:

a) H_O: Interaction effects are zero: The mean difference in main effects of support and experience is the same for all medical specialties.

b) H_O: Interaction effects are zero: The mean difference in main effects of support and experience is the same for all military grades.

This analysis will allow me to understand the relationship among all variables better. That is, is the relationship between support and experience and needs and experience effected by medical speciality and military grade? In either case, I will be in a better position to make my recommendations.

Recommendation. My recommendation will be covered in my position paper and will address the type of medical computer systems the health care providers would like to use, the medical specialists and military grades that may need computer training, and which medical specialists and military grades may need encouragement in changing from their positions of nonsupport of medical computer systems to support.

More specifically, my recommendations will be as follows:

1) Implement the first, second, and third medical computer systems chosen by the users. Suggest any other medical computer systems requested by a certain specialty be given further study.

2) If the null hypothesis for 2 a is true, then I will recommend that all specialists be managed similarly. If it is not true, then I will recommend that medical specialists be managed individually.

3) If the null hypothesis for 2 b is true, then I will recommend that all military grades be managed similarly. If it is not true, then I will recommend that personnel within different military grades be managed differently.

4) If the null hypothesis for 2 c is true, then I will recommend that computer education be treated equally among all medical specialties. If it is not true, then I will recommend that computer education be managed differently within each medical speciality.

5) If the null hypothesis for 2 d is true, than I will recommend that computer education be treated equally among all military grades. If it is not true, then I will recommend that computer education be managed differently within each military grade.

6) If the null hypothesis for 3 a is true, then medical specialties have no effect on experience relating to support. Therefore, I would recommend that the treatment of support through education be treated equally throughout all medical specialties. If it is not true, then I would recommend that the treatment of support through education be aimed at medical specialties.

7) If the null hypothesis for 3 b is true, then military grades have no effect on experience

relating to support. Therefore, I would recommend that the treatment of support through education be treated equally throughout all military grades. If it is not true, then I would recommend that the treatment of support through education be aimed at military grades.

Results

The results are addressed as follows: First, the requested medical computer systems are listed. Next, the hypotheses that relate to experience and support are listed. For each, the decision and rationale are noted; cautions one should be aware of and finally implications of the decisions, follow. Finally, the implications are summarized and addressed in the Summary section that follows.

Requested Medical Systems

Question. What are the top three medical computer systems requested by health care providers?

Answer. The top three medical computer systems requested by health care providers (as a group) are as follows:

1) Test Results
2) Medical Records
3) Patient Scheduling/Follow-up Appointments

Rationale. The rationale is based upon the answers (Note Appendix J for database) to question number ten:

Question 10.

Review the functions listed below. Write the number "1" next to the function that you believe a computer system would make easier or more productive, place the number "2" next to your second choice and a number "3" next to your final choice. (Make only three selections.)

() Cases Done Listing
() Clinical Management Tool
() Research
() Continuing Medical Education Rec.
() Quality Assurance
() Medical Records
() Recovery Listing
() Patient Medications
() Test Results
() Medical Literature
() Patient Scheduling/Follow-up
() Military / Personal Appointments
() Differential Diagnostic Tree
() Medical Expert System - Verify
() Medical Expert System - Remind
() Other

The first, second, and third selections for each response have weights of three, two, and one respectively. The selections were added together giving a total cumulative value for all respondents for each selection. The input was weighted and processed through SPSS^{X} and Lotus 1-2-3, giving the results as follows:

Medical System	Weight
Test Results	520
Medical Records	346
Patient Scheduling	290

(See Appendix K for a complete listing.)

Question (Part B). What are the top three medical systems selected by medical specialty?[7]

Decision. The top three medical computers systems requested by medical specialty are as follows:

Medical System	Weight
1) Biomedical[7]:	
a) Test Results	13
b) Research	9
c) Medical Literature	9
2) Physician Assistant[7]:	
a) Patient Scheduling	54
b) Medical Records	52
c) Test Results	51
3) Medicine[7]:	
a) Test Results	193
b) Medical Records	99
c) Medical Literature	99
4) Surgeons[7]:	
a) Test Results	59
b) Patient Scheduling	47
c) Medical Literature	47
5) Clinicians[7]:	
a) Test Results	70
b) Medical Records	46
c) Medical Literature	43
6) Allergists7:	
a) Test Results	5
b) Clinical Management Tool	3
c) Medical Literature	3
7) Nurses[7]:	
a) Test Results	127
b) Quality Assurance	121
c) Medical Records	103

Cautions. Survey results may only show what is needed today for automation support and not look at future needs. To prevent this problem, it is necessary to focus on future information needs.

Furthermore, respondents may not know enough about what the different medical computer systems can do. Thus, their responses may not address a realistic application.

The weighted values assigned to choice one, two, and three may not represent the true difference between choices. That is, the most needed medical computer system may not be twice as important as the second most needed.

The responses came from many different medical treatment facilities. Some of these facilities have some of the medical computer systems listed in the survey. Thus, a respondent may choose a less important medical computer system for his or her response. To deal with this issue, facilities would have to be added to the database and matched against the medical computers systems found in Appendix C.

About 300 surveys are expected to arrive after the database is initially built and the statistical programs executed. These missing responses could add to the statistical significance. Regardless, there appears to

have been enough responses, in most areas, to give this survey a 95% confidence level.

Implications. The results suggest that the current level of automation for test results is not fulfilling the desires of the health care providers. Therefore, this area must be looked at closer.

The demand for automation of medical records continues to be high on health care providers' list. Unfortunately, the cost appears to be too high to be viable at this time. With the advent of greater hardware and software capabilities at lower cost, this would become be feasible.

Patient scheduling/follow-up appointments is a concern that the author did not expect. Currently, when a health care provider tells a patient to come see him or her in two weeks, the patient must leave and call the appointment desk. Usually, there are no available appointments, and the patient is told to call back next month. If the health care providers could schedule their own follow-ups, some aspects of this problem would be prevented.

Although automated access to medical literature ranked fourth overall, five of the seven medical specialties requested it as one of their top three choices. This would be a viable service that could be

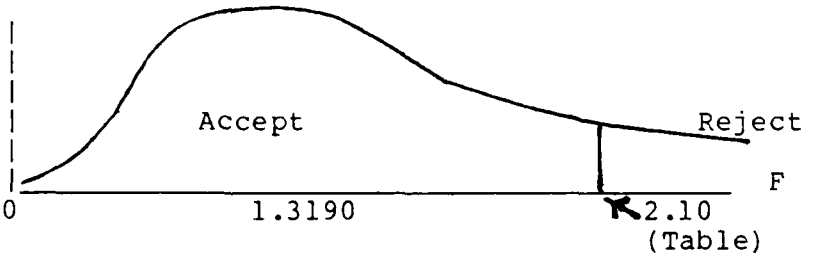
offered at a justifiable cost. Therefore, this issue should be addressed further.

Computer Support by Medical Specialty

Hypothesis. There is no difference in the way support is viewed by different medical specialists.

Decision. The hypothesis should be accepted. There are no two medical specialties significantly different at an alpha level of 0.05.

Rationale. The rationale is based upon the responses (See Appendix J for database) to questions one, five, six, seven, eight, and nine of the survey (Appendix G). The results were processed through SPSS^{X}. The F ratio of 1.3190 is less than 2.10 at an alpha level of 0.05.



Thus, the null hypothesis should be accepted. (See Appendix L for more detail.)

Cautions. The above test was run with two "expert systems" related questions (questions eight and nine of Appendix G). Because expert systems is a very political subject in the health care field, the results could have

been skewed. Consequently, the same test was run without the two "expert systems" questions. Those results follow in the section: Support of Medical Systems without Expert Systems.

The weights assigned to the questions in the survey were equal. For example:

Question one:

A home computer connected to my medical treatment facility would be helpful in my practice.

Question five:

I feel comfortable learning to use a computer.

Both have the same weight. Therefore, when the questions are added together to give a total number for support, each question has the same strength. A better approach would have been to assign higher weights to the questions that were more important as an indicator of support.

The responses from biomedical and allergist were too small (nine and three respectively) to be statistically significant.

The importance of nonsupport must be understood. Medical systems implementation in health care settings may be adversely affected by a nonsupport staff.

Implications. Looking at the results, it appears that all medical specialties should be managed equally.

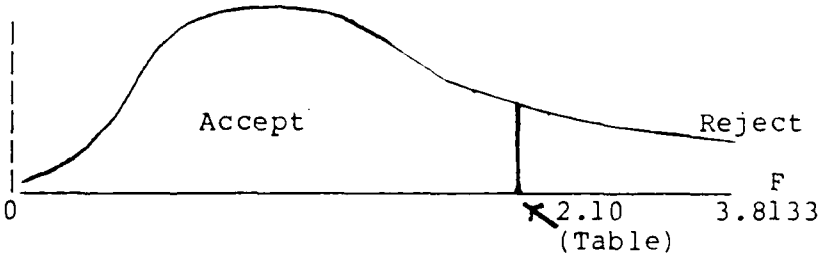
However, because this test was run with two "expert systems" questions, the results may be skewed. Therefore, selection of the final management approach should be delayed until the following test is run without the "expert systems" questions.

Support by Medical Specialty without Expert Systems

Hypothesis. The hypothesis is the same. However, questions eight and nine (Appendix G) were removed from the test.

Decision. The hypothesis is rejected. There is a significant difference between nurses and clinicians.

Rationale. The rationale is based upon the responses (See Appendix J for database.) to questions one, five, six, and seven of the survey (Appendix G). The results were processed through SPSS^{X}. The F ratio of 3.8133 is more than 2.10 at an alpha level of 0.05.



Thus, the null hypothesis should be rejected.

Furthermore, SPSS^{X} states that there is a significant difference between the nurses and clinicians based upon an average mean of 15.0684.

Group	Mean Score
Nurses	14.3309
Clinicians	16.1311

(See Appendix M for more detail.)

Cautions. As previously stated, the weights assigned to the questions in the survey are equal.

Implications. This test suggest that clinicians support medical computer automation more than nurses. However, before a conclusion can be drawn, one must run a multiple classification analysis--a two way analysis of variance. This will give a better indication if there is a relationship between medical specialty and support. Results to follow later in the section: Support by Medical Specialty Holding Experience.

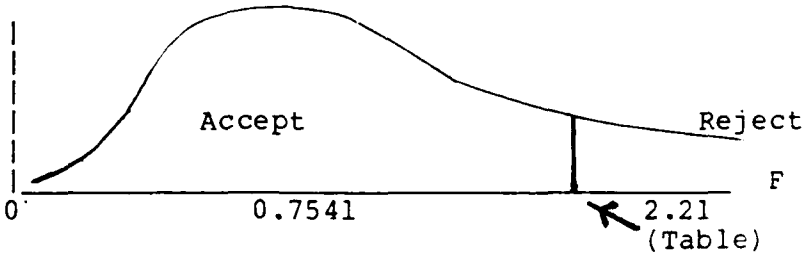
Support by Military Grade without Expert Systems

Hypothesis. There is no difference in the way support is viewed by different military grades.

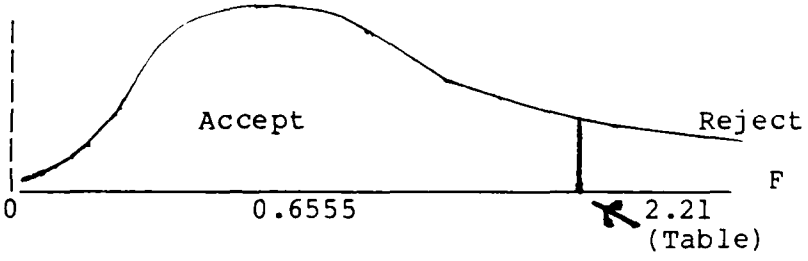
Decision. The hypothesis is accepted. That is, there are no two military grades that are significantly different.

Rationale. The rationale is based upon the responses (See Appendix J for database.) to questions one, five, six, and seven of the survey (Appendix G). Because there was a significant difference when testing without "expert systems", questions eight and nine

(Appendix G) were again left off. The results were processed through SPSS^{x}. The F ratio was 0.7541 and the table F value at an alpha level of 0.05 was 2.21.



Therefore, the hypothesis was accepted. (See Appendix N for more detail.) (Note: This same test was run with questions eight and nine of Appendix G added.) Here too, the hypothesis was accepted as noted below:



(See Appendix O for more detail.)

Cautions. Here too, the weights used in developing the value of support are suspect. Groups one and two provided a low number of responses.

Group	Group Name	Response
One	Second Lieutenants	18
Two	First Lieutenants	28
Three	Captain	216
Four	Major	123
Five	Lieutenant Colonel	39
Six	Colonel	44

Therefore, their responses may not be representative.

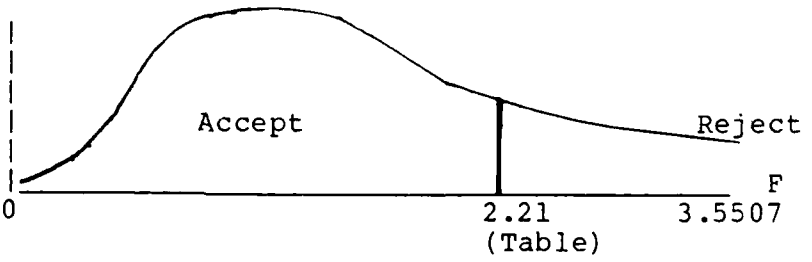
Implications. The computer support is similar among all military grades. Thus, the people across all grades can be managed with the same mechanisms.

Computer Experience by Specialty

Hypothesis. There is no difference in computer experience among different medical specialists.

Decision. The hypothesis should be rejected. There is a significant difference between nurses and clinicians.

Rationale. The rationale is based upon the responses (See Appendix J for database.) to questions two, three, and four of the survey (Appendix G). The results were processed through SPSS^{x}. The F ratio was 3.5507 and the table F value at an alpha level of 0.05 was 2.21.



Therefore, the hypothesis should be rejected. Furthermore, SPSS^{x} states that there is a significant difference between the nurses and clinicians based upon an average mean of 10.4989.

Group	Mean Score
Nurses	10.0221
Clinicians	11.2131

(See Appendix P for more detail.)

Cautions. As noted above, the weights assigned to the questions are equal. More specifically, question 2 (Appendix G) concerning exposure to automation within the formal education process may be time biased, and thus, a better understanding of their level of experience may have been missed. The number of responses (three) from the allergists are too limited to give a representative sample.

Implications. This test suggests that clinicians have more medical computer experience than nurses. However, before a conclusion can be drawn, one must run a multiple classification analysis--a two way analysis of variance. Results to follow in section: Support by Medical Specialty Holding Experience.

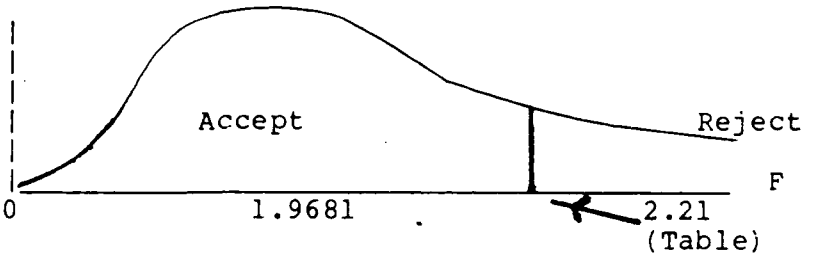
Computer Experience by Military Grade

Hypothesis. There is no difference in computer experience among different military grades.

Decision. The hypothesis should be accepted. No two grades are significantly different.

Rationale. The rationale is based upon the responses (See Appendix J for database.) to questions

two, three, and four of the survey (Appendix G). The results were processed through SPSS^{x}. The F ratio was 1.9681 and the table F value at an alpha level of 0.05 was 2.21.



Therefore, the hypothesis should be accepted. (See Appendix Q for more detail.)

Cautions. As noted above, the weights assigned to the questions (Appendix G) are equal. Groups one and two provided a low number of responses.

Group	Group Name	Response
One	Second Lieutenants	18
Two	First Lieutenants	28
Three	Captain	216
Four	Major	123
Five	Lieutenant Colonel	39
Six	Colonel	44

Therefore, their responses may not be representative.

Implications. Computer experience is similar among all military grades. Thus, the people across all grades can be managed with the same mechanisms.

Support by Medical Specialty Holding Experience

Hypothesis. Interaction effects are zero: The mean difference in main effects of support and

experience is the same for all medical specialties.

Decision. Medical specialty does not affect support. Rather, it is experience that impacts support.

Rationale. The multiple classification analysis shows:

Unadjusted Deviation	Adjusted Medical Specialty	Adjusted Experience
1.06	1.06	0.38

A diminishing effect (lower number) suggests that experience is related to support. This suggests that the experience, not medical specialty, drives support. (See Appendix R for more detail.) In addition, the R squared value goes from 0.047 to 0.521. This increase indicates that the addition of the experience variable adds significantly to the results.

In addition, a test was run looking at support by experience while holding medical specialty. Here the R squared increased only slightly from 0.528 to 0.529. This suggests that the medical specialty impacts support very little. Furthermore, no significant changes took place between adjusted for experience and adjusted for military specialty, as noted below.

Unadjusted Deviation	Adjusted Medical Specialty	Adjusted Experience
0.73	0.73	0.72

(See Appendix S for more detail.)

Cautions. There is no way that one can prove that either medical specialty or experience causes support to be negative or positive. The only thing that can be inferred is that there is a correlation.

Implications. The results suggest that the reason nurses do not support medical computer systems as much as clinicians is not because they are nurses, but because nurses, as a group, have not had as much computer experience as the clinicians. Therefore, management must provide medical systems related educational opportunities for nurses in order to upgrade their support for computers.

Support by Experience Holding Grade

Hypothesis. Interaction effects are zero: the mean difference in main effects of support and experience is the same for all military grades.

Rationale. There was no need to run this test because there was no significant difference in the tests that looked at support and experience relating to grade.

Summary

The geographically dispersed medical treatment facilities; the large, transient, beneficiary population; the limited number of certain medical specialists on active duty; and the variety of medical needs due to these factors, make the automated

needs of the Air Force health care providers especially important. This study analyzed these needs and found that the Air Force health care providers find the automation of test results, medical records, and patient scheduling to be most important.

In part, these automated needs are being addressed in the Air Force. Test results are being automated through the Tri-Service Laboratory System, Tri-Service Radiology System, and Computer Assisted Processing of Cardiographs. Unfortunately, only a few medical treatment facilities have received these (as noted in Appendix C). Therefore, test results remain a realistic concern to the majority of health care providers.

Medical records received the second highest request. Unfortunately, medical records will not be automated in the near future; the current technology is such that the cost remains too high. In addition, the nature of health care in the Air Force would require that the automation of medical records support the constant transfer of data to match the continuous rotation of personnel, from assignment to assignment. This added requirement makes the automation of medical records even more costly.

The automation of patient scheduling is the third choice. Here too, some progress has been made. The

Automated Quality of Care Evaluation Support System is being test to allow for the automation of scheduling. The high number of responses, as cited in this study, supports this initiative.

In addition to these automated needs, this study showed that there was no significant difference in the way computer support is viewed among different military grades or in computer experience among different military grades. When analyzing support of medical computers by medical specialty, however, there was a significant difference between clinicians and nurses. This significant difference appeared again when looking at computer experience by medical specialty. On the surface, it would appear that nurses, because they are nurses, do not support computers. However, after analyzing the data using the multiple classification analysis, it appears that the reason nurses do not support automation as much as clinicians, is not because they are nurses, but rather, because nurses have less computer experience. The correlation, therefore, is between experience and support; raise the experience and support should go up.

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Appendix A

Military Commands

These are the military commands that make up the Air Force force. The acronyms in brackets are common in the military. Each command was represented in the survey.

Strategic Air Command (SAC)

Military Airlift Command (MAC)

Tactical Air Command (TAC)

Air Training Command (ATC)

Air Force Logistics Command (AFLC)

Air Force Systems Command (AFSC)

Air University (AU)

United States Air Force Academy (USAFA)

Air Force Space Command (AFSPACECOM)

Alaskan Air Command (AAC)

Pacific Air Force (PACAF)

United States Air Force Europe (USAFE)

Appendix B

Specialties

These are the medical specialties found in the Air Force.

aerospace medicine
occupational medicine
primary care
pathology
radiation therapy
nuclear medicine
surgery
ophthalmology
anesthesiology
physical medicine
internal medicine
endocrinology
rheumatology
allergy/immunology
dermatology
gastroenterology
aerospace physiology
clinical social work
dietitian
pharmacy
podiatry
veterinarian
preventive medicine
family practice
pediatrics
radiology
neuroradiology
diagnostic radiology
urology
otorhinolaryngology
obstetrics/gynecology
psychiatry
oncology
hematology
nephrology
cardiology
emergency medicine
medical entomology
clinical psychology
alcohol rehabilitation
occupational theraphy
optometry
environmental health

Appendix C

Medical Computer Systems

a. Existing Systems:

(1) Tri-Service Patient Administration (TRIPAD)

Provides patient administrative support to both patients and health care providers. It supports patient movement tracking and casualty reporting for the National Disaster Medical System (NDMS) sites and fixed medical treatment facilties. TRIPAD is being replaced by AQCESS.

(2) Automated Quality of Care Evaluation Support System (AQCESS)

(a) AQCESS is a minicomputer based system designed to support information collection and Quality Assurance decision-making throughout the Department of Defense medical community. AQCESS possesses powerful capabilities in three major functional areas: Quality Assuranace (QA), Admission & Disposition (A&D), and Clinical Records (CR).

(b) When Phase I is complete by mid-1986, AQCESS will be in use at all 82 inpatient facilities worldwide. Phase II enhancements and expansions of AQCESS include: Medical Services Accounting (MSA), Ad Hoc Report generator, ICD-9, Workload Reporting, DEERS interface, Embossed Card Print capability, and Data Archive capabilty. Plans for Phase III include an AQCESS Outpatient Encounter subsystem and a Patient Appointment and Scheduling system (PAS).

(3) Tri-Service Pharmacy System (TRIPHARM)

(a) Supports inpatient and outpatient pharmacy activities including patient medication profiles, drug interaction screening, inventory control, label/list production, and management reports.

(b) TRIPHARM is currently installed at:

1. USAF Regional Hospital Carswell
2. Malcolm Grow USAF Medical Center
3. USAF Medical Center Keesler
4. Wilford Hall USAF Medical Center
5. USAF Hospital Fairchild
6. School of Health Care Sciences
7. USAF Regional Hospital March
8. USAF Regional Hospital Shaw

c. Satellite locations at:

1. David Grant USAF Medical Center
2. USAF Clinic Mayhord
3. USAF Clinic Bolling

4. USAF Regional Hospital Langley
5. USAF Clinic Hickam
6. USAF Clinic Wheeler
7. USAF Clinic McGuire
8. USAF Hospital Charleston

(4) **Tri-Service Laboratory System (TRILAB)**

(a) Supports laboratory operations and management through order/entry results reporting, parameter checking of results, historical result files with comparisons over time, draw list production, laboratory instrument interfaces, procedure/workload accumulation and reporting.

(b) Installed at:

1. USAF Medical Center Wright-Patterson
2. Malcolm Grow USAF Medical Center
3. USAF Regional Hospital Sheppard
4. USAF Medical Center Scott

(5) **Tri-Service Radiology System (TRIRAD)**

(a) Automates patient scheduling, film tracking/management, procedure result reports, and management reports.

(b) Installed at:

1. David Grant USAF Medical Center
2. USAF Medical Center Scott
3. USAF Regional Hospital March
4. Malcolm Grow USAF Medical Center
5. Wilford Hall USAF Medical Center

(6) **Computer Assisted Processing of Cardiograms (CAPOC)**

(a) Provides computerized interpretation, transmission, storage, and retrieval of electrocardiograms on a regional basis. Improves the access of cardiologist to smaller MTFs through ECG overreading.

(b) Installed at: all CONUS MTF's and Hawaii

(c) Projected for: Alaskan Air Command MTF's

(7) **Automated Cardiac Catheterization Laboratory System (ACCLS)**

(a) Automatically digitalizes analog catheterization data providing physiologic measurements and computations.

(b) Installed at:

1. USAF Medical Center Keesler
2. USAF School of Aerospace Medicine
3. USAF Medical Center Wright-Patterson
4. Wilford Hall USAF Medical Center

(8) Defense Eligibility/Enrollment Reporting System (DEERS)

(a) To ensure that our limited resources are applied only to eligible beneficiaries. It is a DoD-wide system. A centralized database of demographic data on personnel eligible for health care.

(b) Installed: worldwide - CONUS is complete.

(9) **Medical Expense Performance Module (MEPM) [combines Uniform Chart of Accounts/Automated Source Data Collection (UCA/ASDC)]**

(a) Records, accumulates, and reports information regarding the expenses incurred and workload performed in military medical and dental treatment facilities using a step-down cost allocation methodology. MEPM will support the data collection from laboratory, pharmacy, radiology, and the resource management office.

(b) Centralized processing at MAJCOMS.

(c) DoD directed worldwide.

(10) **Automated Patient Evacuation System (APES)**

(a) Will automate the flow of information concerning the movement of patient via the aeromedical evacuation system.

(b) An interim capability using Z-100 microcomputers will be used until system implementation is scheduled.

(11) **Medical Readiness Assemblage Material System (MEDRAMS) and Medical Materiel Management System-On Line (MMMS-OL)**

(a) MEDRAMS was developed to provide responsive, dedicated, automated logistics support for prepositioned WRM assemblages.

(b) MMMS-OL is a comprehensive logistics system that will replace the existing batch processed Medical Materiel Management System (MMMS). MMMS-OL is similar to MEDRAMS utilizing approximately 90% of the MEDRAMS software. Current plans are for MMMS-OL to either evolve into the Composite Health Care System-Logistics (CHCS-LOG) or serve as an Air Force interim system until a separate CHCS-LOG system is developed.

(12) **Dental Data System (DDS)**

(a) Replaces the card based Dental Service Report. Interfaces to Base Level Personnel System to support the Periodic Dental Examination Program and to the base level Phase II or Phase IV systems for upward reporting. Includes enhancements to provide local management information. The system runs on currently installed DataPoint hardware.

(b) DDS installation is scheduled for completion by Oct 86.

(13) **Coronary Artery Risk Evaluation (CARE)**

(a) Provides risk potential indicator for developing coronary artery disease, creates a centralized database for trend analysis and research, and manages medical intervention scheduling.

(b) Centralized ADP support currently on Air Force Human

Resources Laboratory hardware with AFOMS/SGSI system development and maintenance.

(14) **Medical Adminstrative Management System (MAMS)**

(a) Command Headquarters system supporting biostatistical database and inpatient diagnostic database. Used to satisfy DoD reporting requirements and as the historical data file for facility, manpower and financial planning.

(b) MAMS provides a good centralized inpatient overview of clinical diagnosis and treatment. AQCESS will provide replacement for the inpatient piece of this system.

(15) **Base Dental Service Report (DSR)**

(a) Supports Air Force requirements for workload reporting and periodic dental examination program.

(b) DDS system efforts will replace this system.

(16) **Defense Medical Regulating Information System (DMRIS)**

(a) Designed to support patient regulating functions, patient evacuation process, and patient movement.

(b) APES is tasked to support medical air evacuation operations, while DMRIS is designed to support the regulating function.

(c) DMRIS linkages have been expanded to a total of 27 CONUS MTFs. Future plans will include linking all CONUS hospitals. Coordination is also being accomplished with other medical automated systems under development.

(17) **Real Time Automated Personnel Identification System (RAPIDS)**

(a) RAPIDS was established to streamline the process of ID card issuance and to improve the timeliness of information into the database.

(b) RAPIDS will provide a user friendly worldwide network of microcomputers linked real time through telecommunications to the DEERS database.

(18) **Defense Medical Information System (DMIS)**

(a) The Defense Medical Information System (DMIS) provides management information and information services to the Office of the Assistant Secretary of Defense (Health Affairs) and its field activities, the military medical departments, and other authorized agencies. It is the most comprehensive repository of information on the overall Defense health system. Its data describe the system in terms of its beneficiary populations, facilities, direct-care costs and workloads, the provision of care through civilian sources under the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), and other aspects of the delivery of health care services.

(b) Sources of DMIS data are:

- UCA
- Biometrics offices of the Services
- Health Facilities Planning Offices of the Services
- Personnel offices of the Services
- DEERS
- OCHAMPUS
- Other systems

b. **Planned Systems**

(1) **Composite Health Care System (CHCS)**

(a) The CHCS is a planned integrated medical information system to provide comprehensive clinical and administrative support to DoD health care facilities. Goals for the system include: improving the quality of patient care, increasing the efficiency of operations, increasing the accuracy and availability of information, and providing standardized and flexible automation support. The CHCS will support functions in numerous administrative, patient care, and ancillary work centers of the MTF and communicate information among departments.

(b) The TRIMIS Program Office has developed a master plan for system design/specification and acquisition. TRIMIS has taken siginificant measures to ensure that the delivered system contains all of the technical and functional capabilities required by the users. The contractor will install CHCS functional modules consisting of patient administration, patient appointment and scheduling, laboratory, radiology, pharmacy, nursing support, and clinical dietetics in three phases. The phasing is designed to assist in the orderly progression from departmental functions to a full facility wide system providing urgently needed capabilities as soon as possible.

(c) The CHCS acquisition strategy includes: a single contract award competition, prioritized and phased requirements, and planned installation at USAF Regional Hospital Sheppard as the Air Force prototype site by October 1987.

(2) **Tri-Service Food Service System (TRIFOOD)**

(a) Will provide menu planning, production planning, purchasing, inventory control, and reference data maintenance.

(b) The system is scheduled for 37 of our most active inpatient facilities.

(3) **Tri-Service Logistics System (TRILOG)**

(a) This system will consist of the Central Processing and Distribution module (CPD). It will support 14 facilities designated to use a CPD function.

(b) The CHCS-LOG, a comprehensive logistics system, will incorporate the CPD system.

(4) **Medical Readiness Automated Data Working Group (MEDRAD)**

(a) This group was formed based on the perceived need for data automation support in combat casualty system.

(b) MEDRAD working group was established by HQ AFOMS, Medical Wartime Hospital Integration Office on 9 April 1985.

(c) Following Baseline Requirments Documents completion, a comparison can be made with other automated systems - TAMMIS and AQCESS.

(d) Although MEDRAD is not a system per se, the work of this group is expected to result in either a new system or modification of an existing system to support contingency operations.

(5) Computerized Occupational Health Program (COHP)

(a) COHP supports the requirements of the Occupational Safety and Health Act of 1970. It must provide a means of scheduling inspections, maintaining shop and individual records, reporting exposures and epidemiological studies.

(b) Implemenetaion: AF-wide FY 87-89

Appendix D

Position Paper

on

Automation Concerns Relating to:
Needs, Experience, and Support

The Air Force's diversified and unique health care needs are being meet in part with automation. Unfortunately, many of the automated systems have been developed through a top down approach. Consequently, it appears that health care providers' medical computer needs, computer experience baseline, and support for automation have not been addressed from the user's level. Furthermore, it appears that the current medical computer systems do not meet the users' needs or are too complicated for them to use without extensive training. This is evidenced by talking with users in the field or observing the limited use of many computers. This lack of support makes it difficult to manage existing medical computer systems and to plan and implement future medical computer systems.

A March 1987 survey (Atch[1]) was sent to ten percent of our health care providers at 28 medical treatment facilities. The survey showed that medical test results and patient scheduling should be automated at each medical treatment facility. Of the 16 preferences for automation support surveyed, test results and patient scheduling received the highest and third highest weighted scores, 520 and 290 respectively. The second highest weighted

[1]Captain Perry's study is the attached and source documentation.

score, 346, was for the automation of medical records. However, the current technology makes the automation of medical records cost prohibitive at this time.

Secondly, the survey revealed that of all the medical specialties surveyed, members of the nurse corps have the least amount of computer experience. The analysis (Atch., Appendix P) showed that the mean score between nurses and clinicians is 10.02 and 11.21 respectively. This is significantly different when based upon an average mean of 10.49. Thus, the nursing corps needs to be given more opportunity to understand how and what medical computers can do for them.

Although there is a significant difference between computer experience and medical specialty (i.e. nurses and clinicians), there is no significant difference between computer experience and military grades. Therefore, grades should not be a factor when managing computers.

Thirdly, the survey shows that support is a product of experience and that to increase support we should increase experience. The analysis (Atch., Appendix R) showed that when experience was added to support and adjusted for independents and covariates it changed from 1.06 to 0.38 for clinicians and from -0.74 to -0.28 for nurses. Furthermore, the R squared value rose from 0.047 to 0.521. These indicate that support is positively correlated to experience.

My recommendations based upon these findings are as follows: First, test results and patient scheduling should be automated at all treatment facilities either with the Automated Quality of Care Evaluation Support System or other Tri-Service Medical Information Systems (Atch., Appendix C). Secondly, education and awareness programs should be developed to increase computer knowledge for all personnel within all military grades to improve the support for and use of facility based automation systems.

Appendix E

Bases in Survey

a) SAC:

Beale Air Force Base, California
Minot Air Force Base, North Dakota
Carswell Air Force Base, Texas

b) MAC:

Dover Air Force Base, Delaware
Travis Air Force Base, California
Scott Air Force Base, Illinois

c) TAC:

Charleston Air Force Base, South Carolina
Homestead Air Force Base, Florida
Myrtle Beach Air Force Base, South Carolina

d) ATC:

Chanute Air Force Base, Illinois
Sheppard Air Force Base, Texas
Cannon Air Force Base, New Mexico

e) AFLC:

Wright-Patterson Air Force Base, Ohio
Kelly Air Force Base, Texas
Tinker Air Force Base, Oklahoma

f) AFSC:

Edwards Air Force Base, California
Eglin Air Force Base, Florida
Hanscom Air Force Base, Massachusetts

g) AU:

Maxwell Air Force Base, Alabama

h) AAC:

Elmendorf Air Force Base, Alaska

i) USAFA:

United States Air Force Academy, Colorado

j) AFSPACECOM

Peterson Air Force Base, Colorado

k) PACAF:

Yokota Air Base, Japan
Osan Air Base, Korea
Misawa Air Base, Japan

L) USAFE:

Semback Air Base, Germany
Incirlik Installation, Turkey
San Vito Dei Normanni Air Station, Italy

Appendix F

Consultants

These are the medical specialties that were involved with the pilot study.

Colonel (MD) Bryan W. Fleming, Jr.	Orth/Surg.
Colonel (MD) Royden W. Marsh	Psych/Neuro.
Colonel (MD) William J. Myers	Internal Medicine
Colonel (MD) Val Hemming	Pediatrics
Colonel (MD) Vernon W. Armbrustmacher	Pathology
Colonel (MD) Albert S. Hale	Neuroradiology
Colonel (MD) Gary Eglinton	OB/GYN
Colonel (MD) Robert J. Ursano	Psychiatry
Colonel (Nurse) Patricia L. Williams	Nursing Affairs
Lt. Colonel (MD) David C. Schutt	Family Practice
Lt. Colonel (MD) Raymond Ten Eyck	Military Medicine

SURVEY INSTRUMENT

HEALTH CARE PROVIDERS' COMPUTER NEEDS

The geographically dispersed medical treatment facilities and the variety of medical needs at each of those facilities, make the computer needs of the Air Force health care provider (physicians, nurses, and physician assistants) especially unique. In order to meet these needs, a better understanding of your views and opinions is required. This survey should be used to express your views and opinions; additional comments are welcome. Any questions concerning this survey should be directed to Captain Michael Perry, SGSIW, Autovon 297-1862.

This survey is covered by the Privacy Act. You will remain anonymous and your comments confidential. Although your participation is voluntary, your support will help insure that your computer needs are considered.

This survey is designed to take no more than five minutes. Answer all the questions in the order in which they appear.

Thank you for your time.

Direction for questions one through nine: place a mark next to the answer that best describes your feelings in response to the statement. (Mark only one choice for each question.)

1. A computer at my home that is connected to my medical treatment facility would be helpful in my practice.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

2. My formal education incorporated the use of computers as part of the curriculum.

Never	Somewhat	Occasionally	Often	Always
( )	( )	( )	( )	( )

3. In my medical or nursing practice, I use computers routinely.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

4. In other areas such as at home, in banks, etc., I have found computers to be a valuable tool.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

5. I feel comfortable learning to use a computer.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

6. In my everyday life, I find computers to cause more problems than they are worth.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

7. Computers can help improve my practice.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

8. I would consider a medical expert system (a computer that makes educated guesses as to which is the best medical course to follow based upon "rules of thumb" obtained from the medical experts that it emulates) helpful in <u>making</u> a medical diagnosis.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

9. I would consider a medical expert system helpful in <u>verifying</u> a medical diagnosis.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
( )	( )	( )	( )	( )

Direction for question 10 is as follows: Review the functions listed below. Write the number "1" next to the function that you believe a computer system would make easier or more productive, place the number "2" next to your second choice, and finally the number "3" next to your last choice. (Make only three selections.)

10. ( ) Cases Done Listing

( ) Clinical Management Tool (e.g. Titrete)

( ) Research

( ) Continuing Medical Education Records

( ) Quality Assurance

( ) Medical Records

( ) Recovery Listing

( ) Patient Medications

( ) Test Results

( ) Medical Literature

( ) Patient Scheduling/Follow-up Appointments

( ) Military / Personal Appointments

( ) Differential Diagnostic Trees

( ) Medical Expert Systems To Verify Diagnoses

( ) Medical Expert Systems To Remind Of Rare Or Peculiar Diseases and Treatment

( ) Other: _____

11. My grade is: O-____.

13. My AFSC is: _____.

12. My primary specialty is: _____.

Again, thank you for your time.

Appendix H

Letter to Air Force Manpower and Personnel Center

REPLY TO ATTN OF: SGSIW

SUBJECT: Medical Providers' Automation Survey Approval Request

TO: HQ AFMPC/DPMYO3
Randolph AFB TX 78150-6001

1. Per my telephone conversation with Lt. Colonel Gorman, I am submitting a survey for your review and approval. IAW AFR 30-23, the information requested for your approval is as follows:

a. Title of survey: Medical Providers' Computer Needs.

b. The geographically dispersed medical treatment facilities and the potential for a variety of medical needs at any and all of these medical treatment facilities, make the computer needs of the health care providers especially unique. No study has been conducted in the Air Force to ascertain the exact nature of these needs. Through this assessment, one should be able to gain a better understanding of providers': computer experience, computer needs as they see them, and support or nonsupport for computer usage. This understanding would help in the planning phase of computer development. This survey is being developed and administered under a time critical condition due mainly because I am an AFIT student in a residency program, and if I cannot complete this study in time, I will be PCSed prior to getting my masters. In addition, no one would be assigned to complete this needed study. Consequently, It would be helpful it you could process this expeditiously.

c. Oppenheim's Questionnaire Design and Attitude Measurement and Stone's Research Methods in Organizational Behavior were used as a guide in developing the pilot interview and final survey. In so doing, physicians from many specialties were consulted. The attached final survey was completed IAW AFR 12-35 and cites that the survey is covered by the Privacy Act and is voluntary in nature.

d. The null hypotheses would center around providers' grade and medical specialty not impacting their needs, experience, and support of medical computer automation.

e. There are around 8,000 medical providers that make up the population.

f. The size of the sample selected will be dictated by the method of selection whereby all medical providers at one large hospital, one medium (or small) hospital, and one clinic within each major command will be questioned. This equates to a sample size of approximately 600 or 10% of the population.

g. The survey will be signed by Brigadier General DeHart (SGP) and sent to the hospital commander at each of the selected medical treatment facilities. All medical providers within the facility will be requested to complete the survey and return it to their resource manager who, in turn, will forward it to AFOMS/SGSIW for tabulation and analysis.

h. The statistical analyses will center around the Likert scale and the Pearson Correlation Coefficient test.. A standard statistical software package will be used to tabulate the results.

i. The results will be included in a feasibility study and submitted to Headquarters Air Force Office of Medical Support and Defense Medical System Support Center. AFR 12-30 has been reviewed and it has been determined, as outlined in Paragraph 10b through 10i, that the survey does NOT fall under the For Official Use Only requirements.

2. I am the project officer for this survey and can be contacted at autovon 297-1862. My office symbol is: AFOMS/SGSIW.

MICHAEL L. PERRY, Capt, USAF, MSC
Medical Systems Officer

Atch: Survey

Appendix I

Staff Summary Sheet

Air Force

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Staff Summary Sheet

	TO	ACTION	SIGNATURE (Surname), GRADE AND DATE		TO	ACTION	SIGNATURE (Surname), GRADE AND DA
1	HQ USAF/ SGSIW	Coord		6			
2	HQ USAF/ SGPC	Coord		7			
3	HQ USAF/ SGPA	Coord		8			
4	HQ USAF/ SGP	Sig		9			
5				10			

SURNAME OF ACTION OFFICER AND GRADE	SYMBOL	PHONE	TYPIST'S INITIALS	SUSPENSE DATE
Captain Perry	HQ USAF/ SGSIW	71862	mlp	

SUBJECT: Health Care Providers' Computer Needs (U) — DATE:

SUMMARY

1. (U) The proliferation of computers into our health care system continues, at an increasing rate. Unfortunately, our health care providers have been given little opportunity to state what functions they would like to see automated.

2. (U) In order for our health care providers' views to be better known, I have developed a survey in conjunction with SGPC and SGHA (Lt Col Quintana and Dr. Opsut). HQ AFMPC/DPMYOS approval was required and included in Tab 3. The survey will be sent to the 28 MTFs (Tab 4) chosen through a stratified, random sampling process.

3. (U) The confidential views of our health care providers' will be consolidated and analyzed and then used for planning future medical computer systems.

RECOMMENDATION

4. (U) That HQ USAF/SGP sign the endorsement letter (Tab 1) and the MAJCOM information letter (Tab 2).

MICHAEL L. PERRY, Capt, USAF, MSC
Medical Systems Officer
AFIT, University of Maryland

4 Tabs
1. Ltr MTF/SG with survey
2. Ltr ALMAJCOMS/SG with atch
3. HQ AFMPC/DPMYOS approval
4. MTFs in survey

AF FORM 1768 PREVIOUS EDITION WILL BE USED

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
BOLLING AFB, D.C. 20332

REPLY TO ATTN OF: SGSIW

SUBJECT: Computer Needs of Health Care Providers

TO: See Distribution List

1. The proliferation of computers into our health care system continues, often times without our health care providers being giving the opportunity for stating what functions they would like to see automated. In an attempt to change this, I am asking that you have your health care providers fill out the attached survey. Their confidential views will be consolidated and analyzed and then used for planning future medical computer systems.

2. Because of the tremendous impact of computers in medicine, I would like to see full participation by your health care providers. Input from all specialities and levels of experience is essential to insure valid results. The survey's should be returned NLT 1987 to:

Captain Michael L. Perry
SGSIW
Bolling AFB
Washington, DC 20332-6188
Autovon: 297-1862

3. Questions concerning this survey should be directed to Captain Perry.

RUFUS M. DeHART, BrigGen, USAF, MC
Director, Professional Affairs
and Quality Assurance
Office of the Surgeon General

Atch
Survey

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
BOLLING AFB, D.C. 20332

REPLY TO ATTN OF: SGSIW

SUBJECT: Computer Needs of Health Care Providers

TO: ALMAJCOMS/SG

1. The proliferation of computers into our health care system continues, often times without our health care providers giving input as to what functions they would like to see automated. In an attempt to change this, we have sent a survey to a randomly selected group of MTFs, some of which are within your command. (See atch.) Their views will be consolidated and analyzed and then used for planning future medical computer systems.

2. The survey has been approved by HQ AFMPC/DPMYOS. Any question concerning the survey should be directed to:

Captain Michael L. Perry
SGSIW
Bolling AFB
Washington, DC 20332-6188
Autovon: 297-1862

3. Thank you for your support.

RUFUS M. DeHART, BrigGen, USAF, MC
Director, Professional Affairs
and Quality Assurance
Office of the Surgeon General

Atch
SGP Ltr with atch

UNITED STATES AIR FORCE
SEPTEMBER 18, 1947

Appendix J

Database

Column 1 is the response for question 1.

Column 2 is the response for question 2.

Column 3 is the response for question 3.

Column 4 is the response for question 4.

Column 5 is the response for question 5.

Column 6 is the response for question 6.

Column 7 is the response for question 7.

Column 8 is the response for question 8.

Column 9 is the response for question 9.

Column 10 is the military grade.

Column 11 is the medical specialty.

Column 12 is the first medical system preference.

Column 13 is the second medical system preference.

Column 14 is the third medical system preference.

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3	1	1	3	4	3	4	3	3	3	9756	11	06	08
5	1	2	4	4	4	5	4	4	5	9716	05	04	08
1	1	1	1	3	3	3	1	2	3	9346	09	10	11
5	3	3	5	4	5	5	3	3	6	9586			
4	3	2	4	4	4	4	2	3	3	9386	09	11	08
3	3	1	5	5	5	5	4	4	4	9756	03	06	05
2	2	4	5	5	5	5	4	4	3	9756	09	05	03
5	1	4	4	5	5	5	5	5	3	9756	16	05	09
2	1	2	4	3	5	4	4	3	3	9786	11	16	12
4	1	4	4	4	3	4	4	4	6	9346	11	06	08
5	1	1	5	3	3	4	4	4	6	9586	09	08	06
1	2	4	5	5	5	5	4	4	3	9186	09	10	06
4	4	3	4	4	4	4	3	3	4	9836	10	09	13
4	2	4	5	4	4	5	4	4	3	9441	01	13	10
4	3	2	4	5	5	5	3	3	3	9341	09	03	10
4	2	2	4	3	4	4	4	4	3	9341	06	13	09
4	2	2	5	5	5	4	4	4	3	9341	09	10	13
3	2	3	5	5	5	5	4	5	3	9341	10	09	08
4	1	2	4	4	4	4	4	4	3	9341	03	10	09
4	2	2	3	4	4	4	3	4	3	9341	10	03	09
4	3	2	4	3	4	4	4	4	3	9341	13	06	09
3	2	2	4	4	4	3	3	3	3	9341	09	06	03
4	3	3	5	5	5	5	5	5	3	9386	09	10	15
5	1	5	4	5	5	5	3	4	3	9346	06	03	04
3	1	5	4	3	4	5	3	4	6	9346	12	11	03
3	3	3	4	4	4	4	4	4	3	9356	05	06	09
4	2	2	5	5	5	5	1	2	3	9361	09	06	10
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4	3	3	5	5	5	5	4	4	3	9381	09	08	07
4	3	2	4	4	4	4	3	4	3	9381	09	08	15
4	5	4	5	5	5	5	4	5	3	9386	10	09	06
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3	1	1	4	4	4	4	2	4	5	9386	11	09	08
4	1	4	5	5	4	5	2	3	4	9386	09	03	08
3	3	2	4	4	5	4	2	1	3	9386	09	10	03
4	2	3	5	5	5	5	4	4	4	9386	09	10	06
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5	5	5	5	4	4	5	4	4	3	9531	06	08	05

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5	4	5	5	5	5	5	4	5	3	9536	01	06	03
1	1	1	5	2	2	3	1	2	4	9536	10	06	03
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5	5	5	5	5	5	5	5	5	3	9536	09	11	10
1	4	5	5	5	5	5	5	5	4	9536	05	06	09
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5	2	4	5	5	5	4	3	4	5	9566	05	10	01
4	4	5	5	5	5	4	2	3	4	9576	06	09	10
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5	5	5	4	5	5	4	4	4	5	9636	02	09	10
4	1	2	5	5	5	5	3	3	3	9636	09	08	06
5	2	1	5	4	5	5	5	5	3	9756	03	I0	14
5	4	1	5	5	5	5	3	4	5	9756	06	09	03
3	2	4	3	4	4	4	3	4	4	9756	11	05	04
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4	5	3	5	5	5	5	2	2	3	9416	09	01	11
4	1	2	4	4	4	4	4	4	4	9736	01	05	11
3	3	3	3	3	3	3	3	3	3	9736	04	05	07
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5	3	1	5	5	5	5	2	3	4	9416	09	10	05
4	1	1	4	4	3	4	5	5	6	9356	13	09	14
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1	5	1	3	5	5	5	5	5	3	9776	06	09	13
3	1	4	4	4	4	4	3	3	3	9341	10	06	15
3	1	3	5	5	5	5	4	3	3	9386			
5	3	3	4	5	5	5	3	3	3	9366	09	08	06
5	3	1	5	5	5	5	3	3	4	9496	01	06	09
4	1	2	2	4	4	4	3	3	3	9366			
5	3	1	4	4	4	5	4	4	3	9286	06	08	13
4	1	4	5	4	5	4	3	3	3	9286	03	05	06
5	4	4	5	5	5	4	4	4	3	9351	16	11	14
4	2	2	4	4	4	4	4	4	3	9356	13	14	15
1	2	2	5	4	5	5	4	4	3	9341	15	10	09
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4	1	2	4	4	5	5	4	4	5	9716	05	11	13
5	1	1	4	5	5	5	5	3	2	9756	09	11	10
5	1	2	4	4	4	4	4	4	3	9756	16	04	09
4	2	1	4	4	4	4	4	4	4	9756	05	09	11
4	1	1	4	5	5	5	4	4	4	9711	02	05	04

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5	2	5	5	5	5	5	5	5	4	9536	12	09	07
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4	3	4	4	5	5	4	4	4	3	9286	05	11	13
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5	5	5	5	5	5	5	1	1	3	9386	09	10	08
1	5	1	1	1	5	5	5	5	6	9536	02	05	16
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1	3	4	4	4	4	4	4	4	6	9386	05	10	11
5	2	5	5	5	5	5	3	3	3	9381	09	10	13
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4	2	4	5	5	5	4	1	1	3	9381	06	03	10
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1	1	5	5	5	5	5	4	5	4	9756	11	10	03
4	1	5	5	5	5	5	4	4	4	9586	09	15	08
3	3	4	5	5	3	4	4	4	3	9286	06	11	13
4	4	5	5	5	5	4	4	4	1	9286	06	13	10
5	1	3	4	5	5	5	4	4	4	9386	06	03	15
5	2	3	2	4	3	4	4	4	3	9386	13	03	10
5	4	5	5	5	5	5	3	5	4	9386	02	03	08
4	2	4	4	4	4	3	3	4	3	9386	09	06	11
5	2	4	4	2	4	4	4	4	6	9366	09	05	11
4	1	3	3	4	3	4	1	1	4	9366	10	09	06
3	1	2	2	3	3	3	2	3	6	9386	11	09	06
2	1	5	5	5	5	5	1	1	3	9586	03	06	10
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4	3	4	4	4	4	4	4	4	3	9366	09	10	14
2	2	2	2	3	3	3	4	3	4	9566	05	11	10
5	2	4	5	5	5	5	3	4	5	9486	06	05	11
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2	1	4	2	3	4	2	4	4	3	9346	13	14	09
2	1	5	2	3	3	2	4	4	3	9286	13	09	08
5	5	5	4	5	4	5	4	4	3	9411	09	06	10
4	4	4	5	5	5	5	3	3	4	9756			
3	2	3	4	4	4	3	1	1	4	9436	11	09	08
5	4	4	5	5	5	5	4	2	5	9576	02	10	16
3	3	3	3	3	3	3	4	2	3	9536	10	01	13
2	3	4	2	4	4	4	1	1	4	9426	09	06	10
4	1	5	5	5	5	5	3	3	3	9511	10	01	09
5	3	5	5	5	5	5	4	4	4	9386	06	03	14
4	1	4	5	5	5	4	4	4	6	9412	10	05	04
3	2	4	4	4	4	4	4	4	3	9391	09	13	02
5	1	3	4	5	4	5	3	1	5	9586	11	04	05
4	2	3	4	4	4	4	3	3	5	9366	03	02	07

4	4	4	4	4	4	4	1	1	4	9366	09	03	10
5	5	5	5	5	5	5	3	3	3	9366	10	06	09
5	4	1	5	5	5	5	5	5	3	9366	02	03	10
4	1	5	5	5	5	5	3	3	4	9366	10	09	15
4	3	4	4	5	4	4	3	4	3	9386	08	09	11
4	3	4	4	4	4	4	3	3	4	9386	10	01	03
5	3	5	4	4	4	5	3	3	3	9386	02	03	10
3	1	1	3	1	3	3	5	5	3	9356	11	14	15
4	3	4	4	4	4	4	3	3	4	9386	09	06	01
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5	4	4	5	5	5	5	5	5	3	9586	06	10	08
4	1	4	4	4	4	4	4	4	3	9366	09	13	10
5	5	5	5	5	5	5	3	3	4	9406	09	10	11
5	3	3	5	5	5	4	4	4	4	9416	10	04	13
5	2	4	4	4	4	4	4	4	4	9416			
3	1	3	4	5	4	4	3	4	3	9326	09	08	10
2	1	4	3	4	4	4	3	4	3	9356	06	08	09
4	4	2	4	5	5	3	4	4	4	9356	01	03	14
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3	3	4	3	3	3	4	3	3	3	9381	09	11	08
5	1	4	5	5	5	4	3	4	3	9586	03	09	10
5	1	4	5	5	5	5	4	4	6	9586	06	14	10
4	3	4	4	4	4	4	3	2	3	9411	15	11	01
2	2	5	2	4	4	3	1	1	3	9356	10	06	08
2	1	2	3	4	4	4	2	2	4	9346			
5	4	5	4	5	5	5	4	3	3	9366	09	10	15
5	3	5	5	5	5	5	4	3	4	9366	06	03	11
4	2	4	5	5	5	5	5	5	1	9726	16	14	08

3	3	2	4	4	4	3	3	3	1	9751	06	09	02
3	1	3	5	5	5	4	3	3	3	9756	04	03	14
3	1	1	3	3	3	3	3	3	2	9756			
2	1	2	4	4	4	4	4	4	4	9756	10	06	05
3	1	2	3	3	3	3	3	3	2	9756	04	12	05
5	4	5	5	5	5	5	4	4	2	9756	06	09	14
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2	1	2	4	3	3	3	3	3	2	9756	09	04	05
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3	2	3	4	4	4	4	4	4	1	9756	09	02	08
2	1	2	5	4	5	4	3	4	3	9756	06	08	05
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4	1	1	3	2	2	3	4	4	3	9756	06	08	12
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2	1	4	3	4	4	3	3	3	3	9286	11	09	08
3	1	5	5	5	5	5	5	5	5	9756	09	11	12
3	1	1	5	5	5	5	5	5	5	9756	06	09	11

Appendix K

Requested Medical Systems

Column 1 is level of need. (For example, 9 is test results.)

Column 2 is the biomedical medical specialty (91).

Column 3 is the 92 medical specialty.

Column 4 is the 93 medical specialty.

Column 5 is the surgeon medical specialty (94).

Column 6 is the clinicians medical specialty (95).

Column 7 is the allergists medical specialty (96).

Column 8 is the nurses medical specialty (97).

Appendix K-2 is sorted by all health care providers.

Appendix K-3 is sorted by 91s.

Appendix K-4 is sorted by 92s.

Appendix K-5 is sorted by 93s.

Appendix K-6 is sorted by 94s.

Appendix K-7 is sorted by 95s.

Appendix K-8 is sorted by 96s.

Appendix K-9 is sorted by 97s.

			33	[illegible]	[illegible]		
			[illegible]	[illegible]	[illegible]		[illegible]
		[illegible]	[illegible]		[illegible]		11
		[illegible]	[illegible]		[illegible]		38
5	[illegible]	11	38	14	34	3	[illegible]
2	[illegible]	[illegible]	70	47	43	[illegible]	27
1	0	33	52	5	10	[illegible]	73
3	5	14	57	16	12	0	52
13	[illegible]	42	66	13	15	[illegible]	15
8	0	6	31	11	33	0	37
2	2	18	31	14	14	3	37
1	0	2	17	24	36	0	27
14	[illegible]	21	18	4	[illegible]	0	17
12	3	3	7	3	11	0	55
15	[illegible]	5	19	12	9	0	8
[illegible]	3	5	7	1	10	0	15
4	[illegible]		1	3	4	[illegible]	45
	[illegible]	0	4	0	1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	875	[illegible]	[illegible]	[illegible]	[illegible]

Appendix L

Support by Medical Specialty with Expert Systems

APR 87 SPSS-X RELEASE 2.0A FOR GCOS
:42:15 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS. LICENSE NUMBER: 13680

```
 1 0        TITLE 'HEALTH CARE PROVIDERS COMPUTER NEEDS"
 2 0        SUBTITLE 'SUPPORT BY SPECIALITY W ES'
 3 0        FILE HANDLE RESPONSE/NAME='SCCARE/RESPONSE'
 4 0        SET PRINTBACK=NO
```

162 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

----------ONEWAY----------

VARIABLE ESUPPOR SUPPORT FOR COMPUTERS AND EXPERT SYSTEMS
BY VARIABLE AFSCBASI BASIC SKILL

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
IWEEN GROUPS	6	129.2881	21.5480	1.3190	.2470
IHIN GROUPS	459	7498.7806	16.3372		
IAL	465	7628.0687			

UP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
)	9	21.6889	5.8190	1.9397	8.0000	29.0000	17.4160 TO 26.3618
POD O	61	21.9016	3.7080	.4749	14.0000	29.0000	20.9517 TO 22.8516
) FS F	146	22.0137	4.2324	.3519	10.0000	30.0000	21.3181 TO 22.7093
RGEONS	52	22.1731	4.4401	.6157	10.0000	30.0000	20.9369 TO 23.4092
INICIA	61	23.2623	4.4792	.5735	9.0000	30.0000	22.1151 TO 24.4096
ERGIS	3	23.6667	3.7859	2.1858	21.0000	28.0000	14.2618 TO 33.0716
SE	134	21.5821	3.4057	.2942	13.0000	29.0000	21.0002 TO 22.1640
IAL	466	22.0644	4.0502	.1876	8.0000	30.0000	21.6967 TO 22.4331

----------ONEWAY----------

```
   VARIABLE ESUPPOR   SUPPORT FOR COMPUTERS AND EXPERT SYSTEMS
BY VARIABLE AFSCBASI  BASIC SKILL


LTIPLE RANGE TEST

HE    PROCEDURE
NGES FOR THE 0.050 LEVEL -

      5.04   5.04   5.04   5.04   5.04   5.04

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
     2.8681 * RANGE * DSQRT(1/N(I) + 1/N(J))
O TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL


 APR 87   HEALTH CARE PROVIDERS COMPUTER NEEDS                    PAG
:42:25    SUPPORT BY SPECIALTY W ES


SCEDING TASK REQUIRED       4.31 SECONDS CPU TIME;       6.00 SECONDS ELAPSED.


 100 COMMAND LINES READ.
   0 ERRORS DETECTED.
   0 WARNINGS ISSUED.
   6 SECONDS CPU TIME.
  10 SECONDS ELAPSED TIME.
     END OF JOB.

L  06
ITION?-RELE
S:/SUBTITLE/
MAND UNKNOWN
EX
ERIFY

SIS,JOUT, T(:,8,16)
S:/SUBTITLE/
ITLE 'Support by specialty w ES'

E 'Health Care Providers Computer Needs"
E HANDLE RESPONSE/NAME='SOCARE/RESPONSE'
3
r
ITLE 'Support by specialty wo ES'

E 'Health Care Providers Computer Needs"
TLE 'Support by specialty wo ES'
HANDLE RESPONSE/NAME='SOCARE/RESPONSE'
  NEWAX
W  R BY AFSCBASI (91,97)/

     ther


     BY AFSCBASI (91,97)/

       ''
     ' ' ' VIAL  EL.
```

Appendix M

Support by Medical Specialty without Expert Systems

APR 87 SPSS-X RELEASE 2.0A FOR GCOS PAGE
:50:34 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS ..C LICENSE NUMBER: 13680

```
1  0        TITLE "HEALTH CARE PROVIDERS COMPUTER NEEDS"
2  0        SUBTITLE 'SUPPORT BY SPECIALTY WO ES'
3  0        FILE HANDLE RESPONSE/NAME='SOCARE/RESPONSE'
4  0        SET PRINTBACK=NO
```

162 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:50:42 SUPPORT BY SPECIALTY WO ES

---------- ONEWAY ----------

VARIABLE SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY VARIABLE AFSCBASI BASIC SKILL

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
IWEEN GROUPS	6	208.2294	34.7049	3.8133	.0010
IHIN GROUPS	461	4195.5826	9.1010		
IAL	467	4403.8120			

UP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
)	9	14.6667	3.9051	1.3017	6.0000	19.0000	11.6649 TO 17.6684
FOD O	61	14.6066	2.7342	.3501	9.0000	19.0000	13.9063 TO 15.3068
) FS F	146	15.1986	3.1668	.2620	5.0000	20.0000	14.6808 TO 15.7165
RGEONS	52	15.8654	2.8903	.4008	8.0000	20.0000	15.0607 TO 16.6701
INICIA	61	16.1311	3.4033	.4357	6.0000	20.0000	15.2596 TO 17.0028
LERGIS	3	17.3333	2.3094	1.3333	16.0000	20.0000	11.5964 TO 23.0703
RSE	136	14.3309	2.7787	.2380	8.0000	20.0000	13.8602 TO 14.8016
IAL	468	15.0684	3.0708	.1419	5.0000	20.0000	14.7894 TO 15.3473

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:50:43 SUPPORT BY SPECIALTY WO ES

---------- ONEWAY ----------

VARIABLE SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY VARIABLE AFSCBASI BASIC SKILL

ULTIPLE RANGE TEST

EF. ROCEDURE
NGES FOR THE 0.050 LEVEL -

5.04 5.04 5.04 5.04 5.04 5.04

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
2.1332 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

MEAN	GROUP	NURSE	PA POD O	EMO	MED FS F	SURGEONS	CLINICIA	ALLERGIS
14.3309	NURSE							
14.6066	PA POD O							
14.6667	EMO							
15.1986	MED FS F							
17.7664	SURGEONS							
18.4311	CLINICIA	*						
17.3333	ALLERGIS							

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:50:43 SUPPORT BY SPECIALTY WO ES

ECEDING TASK REQUIRED 4.34 SECONDS CPU TIME; 5.47 SECONDS ELAPSED.

100 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
6 SECONDS CPU TIME.
9 SECONDS ELAPSED TIME.
END OF JOB.

OF 06
MMON?-

Appendix N

Support by Military Grade without Expert Systems

APR 87 SPSS-X RELEASE 2.0A FOR GCOS PAGE
:57:48 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS _.J LICENSE NUMBER: 13660

```
1  0        TITLE 'HEALTH CARE PROVIDERS COMPUTER NEEDS"
2  0        SUBTITLE 'SUPPORT BY GRADE WO ES'
3  0        FILE HANDLE RESPONSE/NAME='SOCARE/RESPONSE'
4  0        SET PRINTBACK=NO
```

140 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:57:56 SUPPORT BY GRADE WO ES

----------ONEWAY----------

VARIABLE SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY VARIABLE GRADE MILITARY GRADE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
IWEEN GROUPS	5	35.8987	7.1797	.7541	.5834
IHIN GROUPS	464	4417.7715	9.5211		
IAL	469	4453.6702			

IUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
P 1	18	14.4444	2.2809	.5376	11.0000	19.0000	13.3102 TO 15.5787
P 2	28	14.1786	3.0798	.5820	10.0000	20.0000	12.9843 TO 15.3728
P 3	216	15.0463	3.0936	.2105	5.0000	20.0000	14.6314 TO 15.4612
P 4	123	15.2927	3.0775	.2775	6.0000	20.0000	14.7434 TO 15.8420
P 5	40	15.1750	3.2651	.5163	8.0000	20.0000	14.1308 TO 16.2192
P 6	45	15.1111	3.1782	.4738	8.0000	20.0000	14.1563 TO 16.0660
IAL	470	15.0532	3.0816	.1421	5.0000	20.0000	14.7739 TO 15.3325

A... 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:57:56 SUPPORT BY GRADE WO ES

----------ONEWAY----------

VARIABLE SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY VARIABLE GRADE MILITARY GRADE

LTIPLE RANGE TEST

EF' ROCEDURE
NGES FOR THE 0.050 LEVEL -

4.73 4.73 4.73 4.73 4.73

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
2.1819 * RANGE * DSQRT(1/N(I) + 1/N(J))
) TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:57:57 SUPPORT BY GRADE WO ES

ECEDING TASK REQUIRED 4.30 SECONDS CPU TIME; 5.46 SECONDS ELAPSED.

100 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
6 SECONDS CPU TIME.
9 SECONDS ELAPSED TIME.
END OF JOB.

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ITION?-

Appendix O

Support by Military Grade with Expert Systems

APR 87 SPSS-X RELEASE 2.0A FOR GCOS PAGE
:54:04 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS Inc LICENSE NUMBER: 13660

```
 1  0          TITLE 'HEALTH CARE PROVIDERS COMPUTER NEEDS"
 2  0          SUBTITLE 'SUPPORT BY GRADE W ES'
 3  0          FILE HANDLE RESPONSE/NAME='SCCARE/RESPONSE'
 4  0          SET PRINTBACK=NO
```

140 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:54:14 SUPPORT BY GRADE W ES

---------- ONEWAY ----------

VARIABLE ESUPPOR SUPPORT FOR COMPUTERS AND EXPERT SYSTEMS
BY VARIABLE GRADE MILITARY GRADE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
WEEN GROUPS	5	54.2019	10.8404	.6566	.6574
HIN GROUPS	462	7639.8668	16.5365		
AL	467	7694.0677			

GP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
P 1	18	21.5000	3.1669	.7466	17.0000	28.0000	19.9251 TO 23.0749
P 2	28	21.1429	3.8941	.7359	14.0000	29.0000	19.6329 TO 22.6528
P 3	216	22.0741	4.0513	.2757	8.0000	30.0000	21.5307 TO 22.6174
P 4	123	21.9187	4.2341	.3818	9.0000	30.0000	21.1629 TO 22.6745
P 5	39	22.5128	3.8994	.6233	14.0000	29.0000	21.2510 TO 23.7746
P 6	44	22.6364	4.2287	.6372	11.0000	30.0000	21.3513 TO 23.9214
AL	468	22.0449	4.0590	.1876	8.0000	30.0000	21.6762 TO 22.4136

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:54:15 SUPPORT BY GRADE W ES

---------- ONEWAY ----------

VARIABLE ESUPPOR SUPPORT FOR COMPUTERS AND EXPERT SYSTEMS
BY VARIABLE GRADE MILITARY GRADE

LTIPLE RANGE TEST

EF PROCEDURE
NGES FOR THE 0.050 LEVEL -

4.73 4.73 4.73 4.73 4.73

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
2.8755 * RANGE * DSQRT(1/N(I) + 1/N(J))
) TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:54:15 SUPPORT BY GRADE W ES

ECEDING TASK REQUIRED 4.40 SECONDS CPU TIME; 7.03 SECONDS ELAPSED.

100 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
6 SECONDS CPU TIME.
11 SECONDS ELAPSED TIME.
END OF JOB.

Q 6
ITION?-

Appendix P

Computer Experience by Medical Specialty

APR 87 SPSS-X RELEASE 2.0A FOR GCOS PAGE
:37:38 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS _ _ LICENSE NUMBER: 13660

```
1  0          TITLE 'HEALTH CARE PROVIDERS COMPUTER NEEDS'
2  0          SUBTITLE 'COMPUTER EXPERIENCE BY SPECIALTY'
3  0          FILE HANDLE RESPONSE/NAME='SOCARE/RESPONSE'
4  0          SET PRINTBACK=NO
```

140 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:37:46 COMPUTER EXPERIENCE BY SPECIALTY

---------- ONEWAY ----------

VARIABLE EXPERIEN COMPUTER EXPERIENCE
BY VARIABLE AFSCBASI BASIC SKILL

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
IWEEN GROUPS	5	86.5619	17.1124	3.5507	.0037
IHIN GROUPS	453	2183.1876	4.8194		
IAL	458	2268.7496			

UP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
FOD O	61	10.4918	2.1804	.2792	5.0000	15.0000	9.9334 TO 11.0502
O FS F	146	10.4110	2.3943	.1984	4.0000	15.0000	10.0308 TO 10.7912
EGIONS	52	11.1538	2.5001	.3467	3.0000	15.0000	10.4578 TO 11.8499
INICIA	61	11.2131	2.2865	.2902	5.0000	15.0000	10.6336 TO 11.7936
ERGIS	3	10.6667	2.5166	1.4530	8.0000	13.0000	4.4150 TO 16.9183
SE	136	10.0221	1.8786	.1608	4.0000	14.0000	9.7040 TO 10.3401
IAL	459	10.4989	2.2257	.1039	3.0000	15.0000	10.2948 TO 10.7031

A. 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:37:47 COMPUTER EXPERIENCE BY SPECIALTY

---------- ONEWAY ----------

VARIABLE EXPERIEN COMPUTER EXPERIENCE
BY VARIABLE AFSCBASI BASIC SKILL

LTIPLE RANGE TEST

EF' 'ROCEDURE
NGES .OR THE 0.050 LEVEL -

4.73 4.73 4.73 4.73 4.73

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
1.5823 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

MEAN	GROUP	NMPASC UEALUL RD LRI S PEGN EFOREI SDGOC INI FOSSA
10.0221	NURSE	
10.4110	MED FS F	
10.4918	PA POD O	
10.6667	ALLERGIS	
1' 1538	SURGEONS	
. 131	CLINICIA	*

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:37:47 COMPUTER EXPERIENCE BY SPECIALTY

ECDING TASK REQUIRED 4.24 SECONDS CPU TIME; 5.35 SECONDS ELAPSED.

100 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
6 SECONDS CPU TIME.
9 SECONDS ELAPSED TIME.
END OF JOB.

OF 06
ITION?-RELE

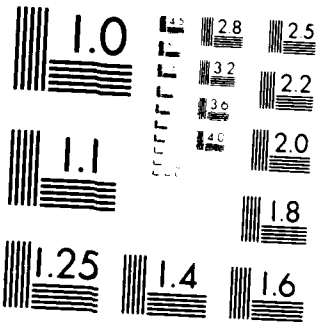
Appendix Q

Computer Experience by Military Grade

AD-A187 976 AIR FORCE HEALTH CARE PROVIDERS: AUTOMATION CONCERNS RELATING TO - NEEDS.(U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH M L PERRY 22 MAY 87 2/2

UNCLASSIFIED AFIT/CI/NR-87-143T F/G 6/5 NL

END
DATE FILMED
8-87



APR 87 SPSS-X RELEASE 2.0A FOR GCOS PAGE
:41:38 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 GCOS-8

SS L.. LICENSE NUMBER: 13660

```
 1 0          TITLE "HEALTH CARE PROVIDERS COMPUTER NEEDS"
 2 0          SUBTITLE 'COMPUTER EXPERIENCE BY GRADE'
 3 0          FILE HANDLE RESPONSE/NAME='SDCARE/RESPONSE'
 4 0          SET PRINTBACK=NO
```

140 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

ERE ARE 74206 WORDS OF MEMORY AVAILABLE.
E LARGEST CONTIGUOUS AREA HAS 74206 WORDS.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PAGE
:41:45 COMPUTER EXPERIENCE BY GRADE

---------- ONEWAY ----------

VARIABLE EXPERIEN COMPUTER EXPERIENCE
BY VARIABLE GRADE MILITARY GRADE

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
IWEEN GROUPS	5	48.5864	9.7173	1.9651	.0820
IHIN GROUPS	464	2290.9115	4.9373		
IAL	469	2339.4979			

UP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
P 1	18	10.7222	1.4473	.3411	9.0000	14.0000	10.0025 TO 11.4420
P 2	28	9.7500	2.1538	.4070	6.0000	14.0000	8.9148 TO 10.5852
P 3	216	10.5417	2.4377	.1659	3.0000	15.0000	10.2147 TO 10.8686
P 4	123	10.8618	2.1360	.1926	4.0000	15.0000	10.4805 TO 11.2431
P 5	40	10.1750	2.1589	.3414	6.0000	14.0000	9.4845 TO 10.8655
P 6	45	10.0000	1.6096	.2399	6.0000	13.0000	9.5164 TO 10.4836
IAL	470	10.5021	2.2334	.1030	3.0000	15.0000	10.2997 TO 10.7046

A... 87 HEALTH CARE PROVIDERS COMPUTER NEEDS PA
:41:46 COMPUTER EXPERIENCE BY GRADE

---------- ONEWAY ----------

```
   VARIABLE  EXPERIEN   COMPUTER EXPERIENCE
BY VARIABLE  GRADE      MILITARY GRADE


LTIPLE RANGE TEST

EFT   ?OCEDURE
NGES ,OR THE 0.050 LEVEL -

       4.73   4.73   4.73   4.73   4.73

E RANGES ABOVE ARE TABLE RANGES.
E VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
     1.5712 * RANGE * DSQRT(1/N(I) + 1/N(J))
) TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL



 APR 87   HEALTH CARE PROVIDERS COMPUTER NEEDS                          PAG
:41:46    COMPUTER EXPERIENCE BY GRADE


ECEDING TASK REQUIRED       4.21 SECONDS CPU TIME;       4.96 SECONDS ELAPSED.


 100 COMMAND LINES READ.
   0 ERRORS DETECTED.
   0 WARNINGS ISSUED.
   6 SECONDS CPU TIME.
   9 SECONDS ELAPSED TIME.
     END OF JOB.

Q  .6
ITION?-RELE
```

Appendix R

Computer Support by Medical Specialty Holding Computer Experience

29 APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS
11:29:02 VARIANCE

* * * A N A L Y S I S O F V A R I A N C E * * *

SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY AFSCBASI BASIC SKILL
WITH EXPERIEN COMPUTER EXPERIENCE

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	SIGNIF F	SIGNIF OF F
MAIN EFFECTS	208.229	6	34.705	7.562	0.000
AFSCBASI	208.229	6	34.705	7.562	0.000
COVARIATES	2084.340	1	2084.340	454.138	0.000
EXPERIEN	2084.340	1	2084.340	454.138	0.000
EXPLAINED	2292.569	7	327.510	71.358	0.
RESIDUAL	2111.243	460	4.590		
TOTAL	4403.812	467	9.430		

470 CASES WERE PROCESSED.
2 CASES (0.4 PCT) WERE MISSING.

29 APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS
11:29:02 VARIANCE

* * * MULTIPLE CLASSIFICATION ANALYSIS * * *

SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY AFSCBASI BASIC SKILL
WITH EXPERIEN COMPUTER EXPERIENCE

GRAND MEAN = 15.07 (Support)

VARIABLE + CATEGORY	N	UNADJUSTED DEV'N	ETA	ADJUSTED FOR INDEPENDENTS DEV'N	BETA	ADJUSTED FOR INDEPENDENTS + COVARIATES DEV'N	BETA
AFSCBASI							
91 BIO	9	-0.40		-0.40		-0.46	
92 PA POD OPT PHY OC	61	-0.46		-0.46		-0.45	
93 MED FS FP PED	146	0.13		0.13		0.22	
94 SURGEONS	52	0.80		0.80		0.17	
95 CLINICIAN	61	1.06		1.06		0.38	
96 ALLERGIST	3	2.26		2.26		2.10	
97 NURSE	136	-0.74		-0.74		-0.28	
			0.22		0.22		0.11
MULTIPLE R SQUARED					0.047		0.521
MULTIPLE R					0.217		0.722

AFSC

(Experience)

Appendix S

Computer Support by Computer Experience Holding Military Specialty

APR 87 SPSS-X RELEASE 2.0A FOR CCCS
:02:08 7 COMMUNICATION GP, WASHINGTON HIS DPS8/70 CCCS-8 PAGE

SS INC LICENSE NUMBER: 13660

```
1 0        TITLE 'HEALTH CARE PROVIDERS COMPUTER NEEDS"
2 0        SUBTITLE 'SUPPORT AND EXPERIENCE HOLDING SPECIALTY'
3 0        FILE HANDLE RESPONSE/NAME='SCCARE/RESPONSE'
4 0        SET PRINTBACK=NO
```

NOVA' PROBLEM REQUIRES 1789 WORDS OF MEMORY.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS
:02:16 SUPPORT AND EXPERIENCE HOLDING SPECIALTY PAGE

* * * ANALYSIS OF VARIANCE * * *

SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY EXPERIEN COMPUTER EXPERIENCE
WITH AFSCBASI BASIC SKILL

RCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
IN JECTS	2360.210	12	196.851	42.565	0.
EXPERIEN	2360.210	12	196.851	42.565	0.
VARIATES	4.802	1	4.802	1.043	0.308
AFSCBASI	4.802	1	4.802	1.043	0.308
PLAINED	2365.013	13	181.156	39.382	0.
SIDUAL	2098.658	456	4.602		
AL	4463.670	469	9.496		

470 CASES WERE PROCESSED.
0 CASES (0. PCT) WERE MISSING.

APR 87 HEALTH CARE PROVIDERS COMPUTER NEEDS
:02:16 SUPPORT AND EXPERIENCE HOLDING SPECIALTY PAGE

* * MULTIPLE CLASSIFICATION ANALYSIS * * *

SUPPORT SUPPORT FOR COMPUTERS WO EXPERT SYS
BY EXPERIEN COMPUTER EXPERIENCE
WITH AFSCBASI BASIC SKILL

AND MEAN = 15.05

RIABLE + CATEGORY	N	UNADJUSTED DEV'N	UNADJUSTED BETA	ADJUSTED FOR INDEPENDENTS DEV'N	ADJUSTED FOR INDEPENDENTS BETA	ADJUSTED FOR INDEPENDENTS + COVARIATES DEV'N	ADJUSTED FOR INDEPENDENTS + COVARIATES BETA

PERIEN				
3	1	-4.05	-4.05	-4.07
4	4	-7.55	-7.55	-7.59
5	5	-5.05	-5.05	-5.12
6	9	-4.61	-4.61	-4.61
7	23	-4.18	-4.18	-4.19
8	37	-3.00	-3.00	-2.98
9	69	-1.55	-1.55	-1.54
10	74	-0.09	-0.09	-0.06
11	105	0.98	0.98	0.98
12	54	1.59	1.59	1.58
13	44	2.20	2.20	2.15
14	30	2.55	2.55	2.56
15	15	4.01	4.01	3.98
		0.73	0.73	0.72

LTIPLE R SQUARED	0.528	0.529
LTIPLE R	0.726	0.727

CEDING TASK REQUIRED 3.94 SECONDS CPU TIME; 4.69 SECONDS ELAPSED.

99 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
ECONDS CPU TIME.
SECONDS ELAPSED TIME.
END OF JOB.

OF 06
TION?-

Endnotes

[1]Grade is generally an indicator of tenure in the service and professional experience.

[2]Not all major commands have all three types of medical treatment facilities.

[3]Dr. Opsut believed that 600 health care providers were more than enough to give a statistical significant result when using the ANOVA and Two-Way ANOVA. Thus, a response of less than 600 would not diminish the significance.

[4]Lt. Colonel Mackie, General DeHart's executive officer, told me that he does not see a problem with getting the survey signed by General DeHart. If there is a problem, I've addressed my alternative in the contingency section.

[5]*The analysis of variance* (ANOVA) is a technique for comparing several populations. It is a special type of multiple regression.

[6]When there are two or more factors in an analysis of variance, there may be interactions between the factors. Interaction effects occur when the difference in the responses to the levels of one factor is related to the levels of another factor. In that case, a Two-Way ANOVA is needed.

[7]The medical specialties are broken down as follows:

a) Biomedical (91XX) includes:

- Clinical Psychologist
- Psychologist
- Social worker

b) PA Pod Opt Phy Oc (92XX) includes:

- Occupational Therapist
- Physical Therapist
- Optometrist
- Podiatry
- Physician Assistant

c) Med FS FP Ped (93XX) includes:

- Staff Clinician
- General Practice Physician
- Staff Clinician
- General Practice Physician
- Family Physician
- Aerospace Medical Physician
- Pediatrician
- Physical Medicine Physician
- Internist
- Emergency Physician

d) Surgeons (94XX) includes:

- Surgeon
- Urologist
- Ophthalmologist
- Otorthinolaryngologist
- Orthopedic Surgeon
- OB/GYN

e) Clinician (95XX) includes:

- Pathologist
- Diagnostic Radiologist
- Dermatologist
- Anesthesiologist
- Neurologist
- Psychiatrist
- Radiotherapist

f) Allergist (96XX) includes:

- Allergist

g) Nurse (97XX) includes:

- Nursing Administration
- Mental Health Nurse
- Operating Room Nurse
- Nurse Anesthetist
- Clinical Nurse
- Flight Nurse
- Nurse-Midwife
- Environmental Health Nurse

Figure Caption

Figure 1. Air Force organization structure. Source: U. S. Air Force Command Organization Chart.

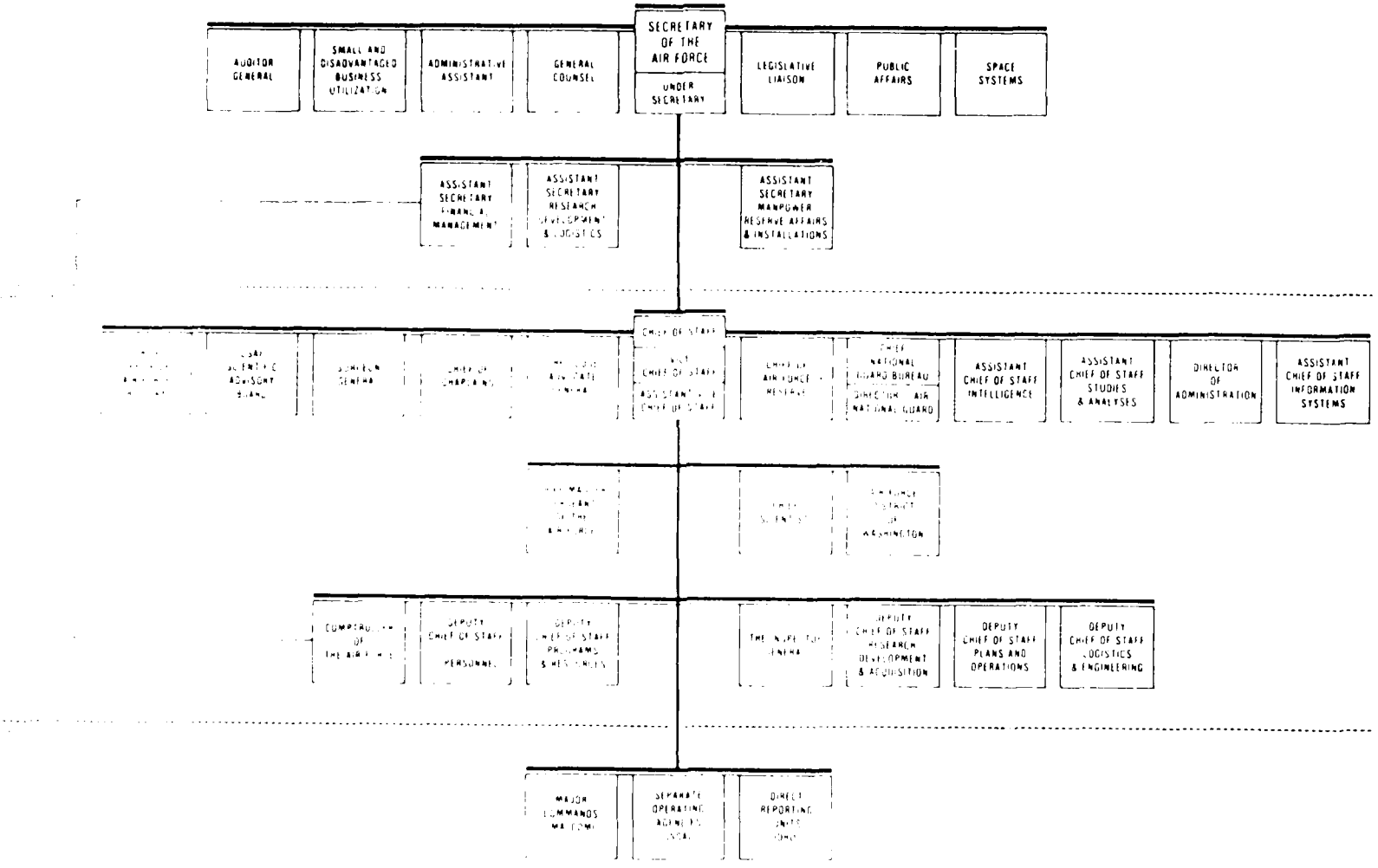

AUDITOR GENERAL
SMALL AND DISADVANTAGED BUSINESS UTILIZATION
ADMINISTRATIVE ASSISTANT
GENERAL COUNSEL
SECRETARY OF THE AIR FORCE
UNDER SECRETARY
LEGISLATIVE LIAISON
PUBLIC AFFAIRS
SPACE SYSTEMS
ASSISTANT SECRETARY FINANCIAL MANAGEMENT
ASSISTANT SECRETARY RESEARCH DEVELOPMENT & LOGISTICS
ASSISTANT SECRETARY MANPOWER RESERVE AFFAIRS & INSTALLATIONS
CHIEF OF STAFF
VICE CHIEF OF STAFF
ASSISTANT VICE CHIEF OF STAFF
CHIEF NATIONAL GUARD BUREAU
DIRECTOR AIR NATIONAL GUARD
ASSISTANT CHIEF OF STAFF INTELLIGENCE
ASSISTANT CHIEF OF STAFF STUDIES & ANALYSES
DIRECTOR OF ADMINISTRATION
ASSISTANT CHIEF OF STAFF INFORMATION SYSTEMS
DEPUTY CHIEF OF STAFF PERSONNEL
DEPUTY CHIEF OF STAFF RESEARCH DEVELOPMENT & ACQUISITION
DEPUTY CHIEF OF STAFF PLANS AND OPERATIONS
DEPUTY CHIEF OF STAFF LOGISTICS & ENGINEERING
MAJOR COMMANDS
SEPARATE OPERATING AGENCIES
DIRECT REPORTING UNITS

Figure Caption

Figure 2. Organization structure of the Air Force Surgeon General's Staff. Source: Air Force Pamphlet 23-21, U. S. Air Force Command Organization Chart.

HEADQUARTERS AIR FORCE OFFICE OF MEDICAL SUPPORT

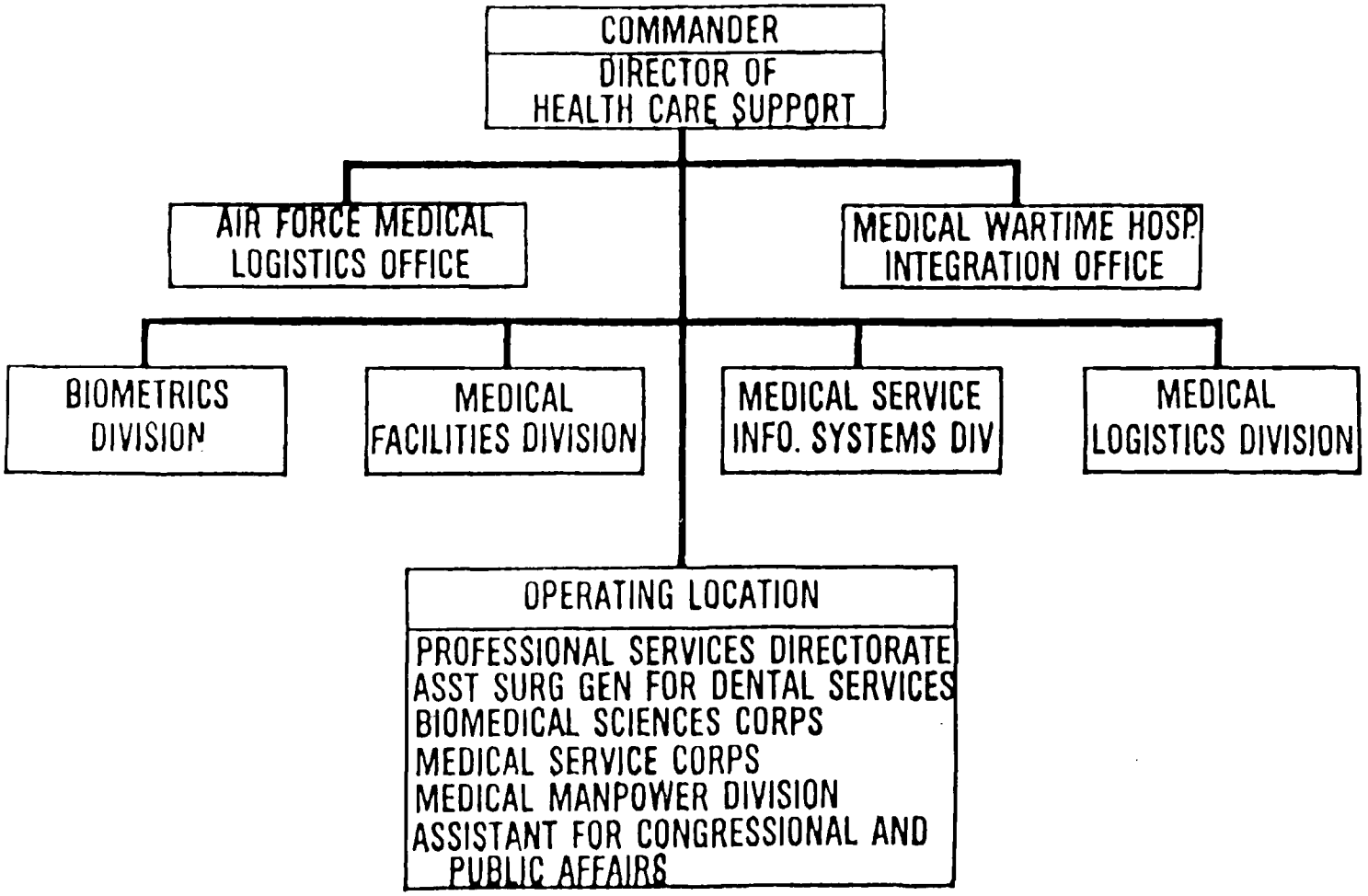
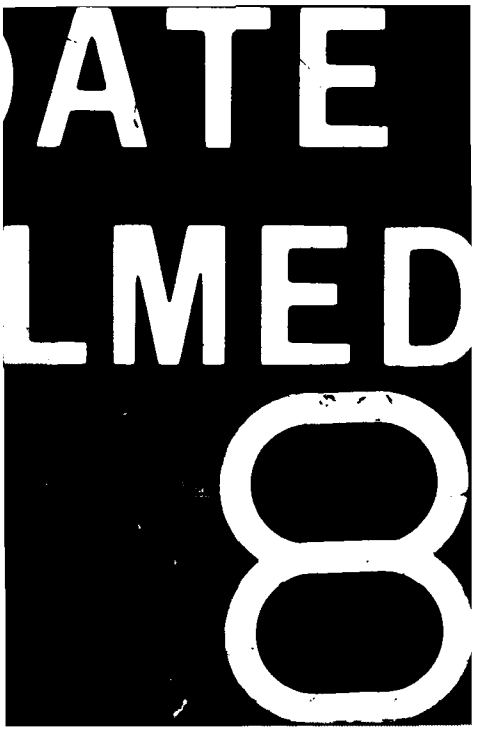


Fig 1

Figure Caption

Figure 3. U. S. Air Force bases with supporting medical treatment facilities. Source: Air Force Magazine.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